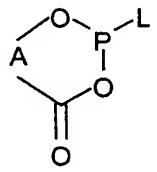
What is claimed is:

1. A process for preparing trivalent organophosphorus compounds which bear at least one structural unit **S**



(S)

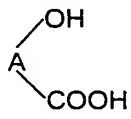
where A is a divalent substituted or unsubstituted alkyl or aryl radical which may form a ring system as per structural unit S, and the L radical is an organic radical bonded to the phosphorus atom via an oxygen or carbon atom, or is a halide,

by condensing phosphorus compounds of the formula **i**

$PHal_aR_{(3-a)}$ (i)

where Hal is halide selected from chlorine, bromine and iodine, and the halides may be the same or different, R is an organic radical bonded to the phosphorus via a carbon or oxygen atom, and $a = 2$ or 3,

with an organic compound of the formula **S'**



(S')

where A is as defined for the structural unit **S**,

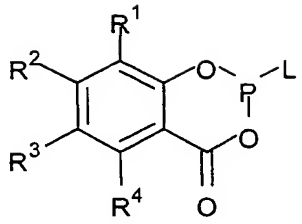
which comprises

carrying out the reaction in the presence of at least one basic ion exchange resin.

2. The process of claim 1,

wherein

trivalent organophosphorus compounds which have at least one structural unit **T**



(T)

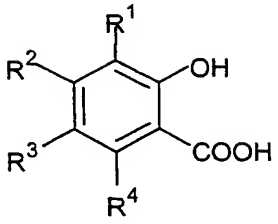
where R^1, R^2, R^3, and R^4 are each independently selected from monovalent substituted and unsubstituted aliphatic, alicyclic, aromatic, heteroaromatic, mixed aliphatic-alicyclic, mixed aliphatic-aromatic, heterocyclic, mixed aliphatic-heterocyclic, hydrocarbon radicals having from 1 to 50 carbon atoms, H, F, Cl, Br, I, $-CF_3$, $-CH_2(CF_2)_jCF_3$ with j = 0 – 9, $-OR^9$, $-COR^9$, $-CO_2R^9$, $-CO_2M$, $-SR^9$, $-SO_2R^9$, $-SOR^9$, $-SO_3R^9$, $-SO_3M$, $-SO_2NR^9R^{10}$, $-NR^9R^{10}$, $-N=CR^9R^{10}$, where R^9 and R^{10} are each independently selected from H, monovalent substituted and unsubstituted aliphatic and aromatic hydrocarbon radicals having from 1 to 25 carbon atoms, and M is an alkali metal ion, formally half an alkaline earth metal ion, ammonium ion or phosphonium ion, or adjacent R^1 to R^4 radicals together form a fused substituted or unsubstituted aromatic, heteroaromatic, aliphatic, mixed aromatic-aliphatic or mixed heteroaromatic-aliphatic ring system; and the substituted hydrocarbon radicals may have as substituents those selected from $-N(R^5)_2$, $-NHR^5$, $-NH_2$, fluorine, chlorine, bromine, iodine, -OH, -CN, $-C(O)-R^5$, -C(O)H or $-C(O)O-R^5$, $-CF_3$, $-O-R^5$, $-C(O)N-R^5$, $-OC(O)-R^5$ and/or $-Si(R^5)_3$, where R^5 is a monovalent hydrocarbon radical preferably having from 1 to 20 carbon atoms, and, when a plurality of hydrocarbon radicals R^5 is present, they may be the same or different, and R^1, R^2, R^3 and R^4 radicals may be the same or different, and L is an organic radical bonded to the phosphorus atom via an oxygen or carbon atom, or is a halide,

are prepared by condensing phosphorus compounds of the formula **i**

$$PHal_aR_{(3-a)} \qquad (i)$$

where Hal is halide selected from chlorine, bromine and iodine, and the halides may be the same or different, R is an organic radical bonded to the phosphorus via a carbon or oxygen atom and a = 2 or 3,

with an organic compound of the formula **T'**



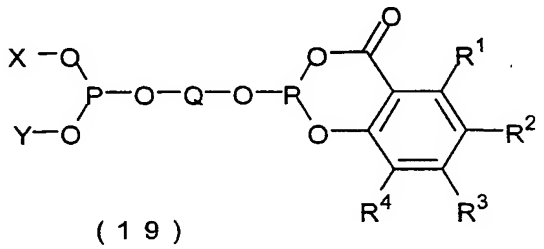
(T')

where the R^1 to R^4 radicals are each as defined for the structural unit **T**.

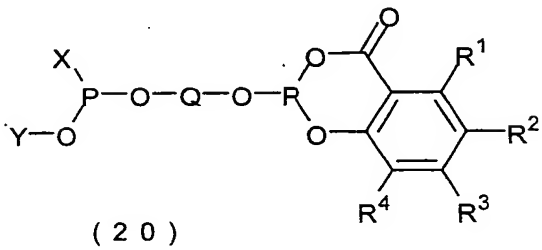
3. The process of claims 1 or 2,

wherein

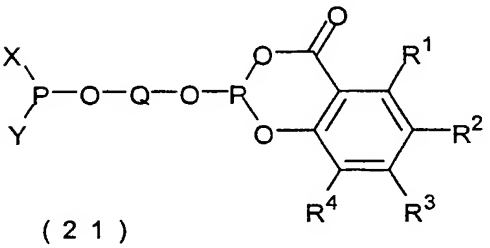
the trivalent organophosphorus compound prepared is at least one compound selected from the compounds of the following formulae



(1 9)



(2 0)



(2 1)

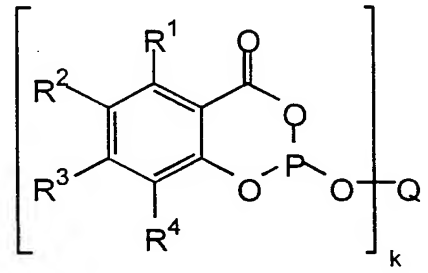
where X and Y are substituted or unsubstituted, aliphatic, alicyclic, aliphatic-alicyclic, heterocyclic, aliphatic-heterocyclic, aromatic-aromatic or aliphatic-aromatic hydrocarbon radicals having from 1 to 50 carbon atoms, and X and Y are the same or different or covalently joined together, and where Q is an at least divalent, substituted or unsubstituted aliphatic, alicyclic, aliphatic-alicyclic, heterocyclic, aliphatic-heterocyclic, aromatic, aromatic-aromatic or aliphatic-aromatic hydrocarbon radical, and the substituted hydrocarbon radicals may have as substituents those selected from $-N(R^5)_2$, $-NHR^5$, $-NH_2$, fluorine, chlorine, bromine, iodine, -OH, -CN, $-C(O)-R^5$, -C(O)H or $-C(O)O-R^5$, $-CF_3$, $-O-R^5$, $-C(O)N-R^5$, $-OC(O)-R^5$ and/or $-Si(R^5)_3$, where R^5 is a monovalent hydrocarbon radical preferably having from 1 to 20 carbon atoms, and, when a plurality of hydrocarbon radicals

R^5 is present, they may be the same or different, and where R^1 to R^4 are each as defined for the structural unit **T**.

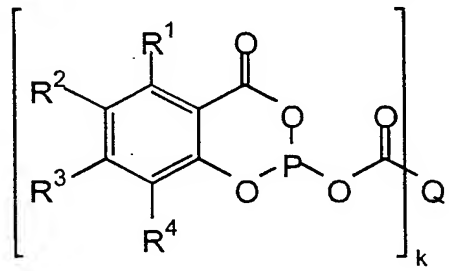
4. The process of at least one of claims 1 to 3,

wherein

the trivalent organophosphorus compounds prepared are phosphites of the formula **10** or **11**



(10)



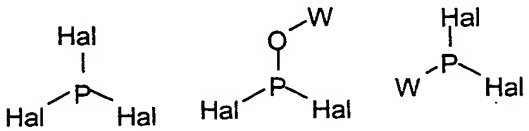
(11)

where R^1, R^2, R^3, and R^4 are each as defined for the structural unit **T**, Q is a k-valent substituted or unsubstituted aliphatic, alicyclic, mixed aliphatic-alicyclic, heterocyclic, mixed aliphatic-heterocyclic, aromatic, heteroaromatic, mixed aliphatic-aromatic, hydrocarbon radical having from 1 to 50 carbon atoms, and aliphatic moieties of Q may contain oxygen, sulfur and/or nitrogen, and where the substituted hydrocarbon radicals may have as substituents those selected from $-N(R^5)_2$, $-NHR^5$, $-NH_2$, fluorine, chlorine, bromine, iodine, -OH, -CN, $-C(O)-R^5$, -C(O)H or $-C(O)O-R^5$, $-CF_3$, $-O-R^5$, $-C(O)N-R^5$, $-OC(O)-R^5$ and/or $-Si(R^5)_3$, where R^5 is a monovalent hydrocarbon radical preferably having from 1 to 20 carbon atoms, and, when a plurality of hydrocarbon radicals are R^5 is present, they may be the same or different, k is at least 2, and R^1, R^2, R^3 and R^4 in the individual structural elements T bonded to Q may each have the same or different definitions.

5. The process of at least one of claims 1 to 4,

wherein

the phosphorus compound of the formula **i** used is at least one compound selected from the compounds of the following formulae



(0) (1) (6)

where **W** is an organic radical.

6. The process of claim 5,

wherein

the phosphorus compound of the formula **i** used is a compound of the formula **1** which is prepared by reacting a compound **0** with an organic compound having at least one hydroxyl group **W** in the presence of a basic ion exchanger.

7. The process of claim 6,

wherein

the compound having at least one hydroxyl group **W** is at least one substituted or unsubstituted compound selected from methanol, ethanol, n-propanol, isopropanol, 1-butanol, 2-butanol, t-butanol, 2-ethylhexanol, isononanol, isodecanol, isotridecanol, phenol, phenol derivatives, 1,4-dihydroxybenzene, 1,2-dihydroxybenzene, 1,8-dihydroxynaphthalene, 1,1'-binaphthyl-2,2'-diol, 2,2'-binaphthyl-1,1'-diol, or a compound which has one or more hydroxyl groups and one or more of the structural units T, and the substituted compounds have substituents selected from primary, secondary and tertiary alkyl groups, alicyclic groups, aromatic groups, $-N(R^5)_2$, $-NHR^5$, $-NH_2$, fluorine, chlorine, bromine, iodine, -OH, -CN, $-C(O)-R^5$, -C(O)H or $-C(O)O-R^5$, $-CF_3$, $-O-R^5$, $-C(O)N-R^5$, $-OC(O)-R^5$ and/or $-Si(R^5)_3$, where R^5 is a monovalent hydrocarbon radical preferably having from 1 to 20 carbon atoms, and, when a plurality of hydrocarbon radicals R^5 is present, they may be the same or different.

8. The process of at least one of claims 5 to 7,
wherein
compounds of the formula **1** are prepared by in each case initially charging the phosphorus compound together with one or more basic ion exchange resins and subsequently metering in the compound having at least one OH group.

9. The process of at least one of claims 3 and 4,
wherein
asymmetric diphosphorus compounds of the formulae **19**, **20**, **21**, **10** and **11** are prepared by initially charging the compound having OH groups together with one or more basic ion exchange resins and subsequently metering in one or more phosphorus compounds.

10. The process of one of claims 1 to 9,
wherein
the reaction of a compound having at least one phosphorus-halogen bond with a compound having at least one hydroxyl group is one reaction step.

11. The process of claim 10,
wherein,
when carrying out a plurality of reaction steps, they may be carried out continuously or batchwise.

12. The process of claim 10 or 11,
wherein,
when carrying out a plurality of reaction steps, identical or different ion exchangers may be used in the reaction steps.

13. The process of one of claims 10 to 12,
wherein,
when carrying out the plurality of reaction steps, identical or different temperatures may be set in the reaction steps.

14. The process of at least one of claims 1 to 13,
which
is carried out in the presence of one or more solvents which are selected from the group consisting of benzene, toluene, xylene, pentane, n-hexane, n-heptane, cyclohexane, methylcyclohexane, diethyl ether, diisopropyl ether, methyl tert-butyl ether, anisole, tetrahydrofuran, 1,4-dioxane, 1,3-dioxolane, ethyl acetate, isobutyl acetate, tert-butyl acetate, ethylene carbonate, propylene carbonate, 1,2-butylene carbonate, acetone, 2-butanone, 3,3-dimethyl-2-butanone, benzonitrile, propionitrile, acetonitrile, lactones, N-methylpyrrolidone, dimethylformamide, dimethyl sulfoxide, N-alkylmorpholines, amines and sulfolane.

15. The process of at least one of claims 1 to 14,
which
is carried out in the presence of polymeric, weakly basic ion exchange resins based on styrene-divinylbenzene copolymers which bear N,N-diakylamine groups.

16. The process of one of claims 1 to 15,
wherein
the ion exchanger is used in the form of particles having an average particle size of from 10 µm to 2 mm or in the form of a fixed package.

17. The process of one of claims 1 to 16,
wherein
the ion exchanger is dried before use in the process according to the invention.

18. The process of one of claims 1 to 17,
which
is carried out in the presence of a proton transferrer.